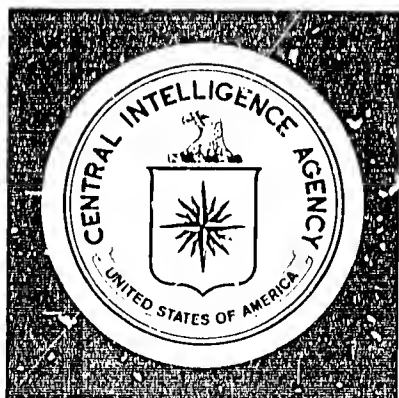


CIAER IM 75-022 INTELLIGENCE MEMORANDUM OPEC: THE IMPACT OF  
TECHNOLOGY TRANSFER  
Approved For Release 2001/08/21 : CIA-RDP86T00608R000500180021-6  
DECEMBER 1975 CONFIDENTIAL ER IM 75-22 1 OF 1

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NOFORN

(See inside cover)



# Intelligence Memorandum

## *OPEC: The Impact of Technology Transfer*

**Confidential**

ER IM 75-22

December 1975

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## OPEC: The Impact of Technology Transfer

### SUMMARY

OPEC imports of technology-related goods, such as machinery and transport equipment, which were on the order of \$7 billion in 1973, have soared since the massive hike in oil prices. In 1974 they reached \$12 billion and we expect these imports to approach \$18 billion this year. By 1980 technology-related imports will likely top \$50 billion.

The United States should remain the largest supplier of technology-related products through 1980 followed closely by West Germany and Japan. The US share of the market was 25% in 1974. The West Germans had 20% and the Japanese 17%. We expect these two countries to gradually improve their positions at the expense of the United States.

More than two-thirds of technology-related imports are going to the Middle East, where severe labor constraints dictate a highly capital intensive development strategy. Per capita technology imports by sparsely populated countries such as Saudi Arabia are running 17 times the level of heavily populated Nigeria and 23 times that of Indonesia.

Most imported technology is earmarked for building up the domestic economy and improving living standards. Plans for establishing export-oriented industries are mainly those connected with petroleum, where the oil producers have a competitive advantage. In the 1980s, OPEC probably will have an export capability large enough to have an impact on world markets for petrochemicals and perhaps other intermediate products such as iron pellets.

OPEC countries, however, will not be able to develop high-technology export industries and become competitive with developed countries. On the contrary, each step up the technology ladder will mean more, not less, dependence on the industrialized world. Moreover, Western firms will continue to advance their technology, in part because of their involvement in the huge projects sponsored by OPEC nations.

Note: Comments and queries regarding this memorandum are welcomed. They may be directed to [REDACTED] of the Office of Economic Research, Code 143, Extension 7931.

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## DISCUSSION

### The OPEC Technology Market, 1972-74

1. Most OPEC countries had ambitious development programs under way even before the huge 1 January 1974 oil price hike. These programs aimed at rapid modernization through acquiring and absorbing Western technology in all forms, from direct purchases of machinery to technical and managerial assistance and education abroad. The most readily available surrogate for these hard-to-measure flows is technology-related imports — scientific apparatus, machinery and equipment, and transport equipment.\*

2. In the years after the oil price hike, OPEC's technology-related imports soared from \$7 billion in 1973 to \$12 billion in 1974. After discounting for inflation, we estimate that these imports grew 7% in 1973 and by a striking 32% in 1974. The 1974 importation rate is continuing in 1975, based on evidence through midyear.

3. Thirteen countries — the United States, Canada, Japan, and 10 major European countries — accounted for about 95%, or \$11 billion, of the technology-related exports to OPEC in 1974 (see the chart). Other countries, including Communist nations, shipped no more than \$700 million worth of these goods last year. The only major Soviet involvement was in Iran, where the USSR is building a steel plant with an eventual capacity of 4 million metric tons per year.

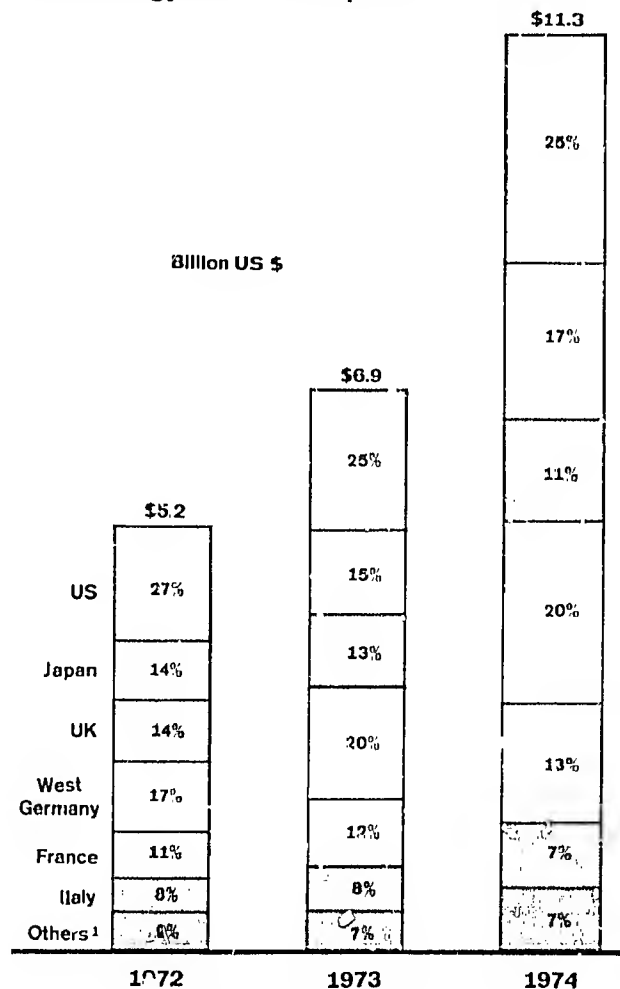
4. Of the technological imports sold by the 13 countries in 1974, 27% consisted of motor vehicles, including large numbers of trucks. Another 19% was nonelectrical machines, not otherwise specified. The remainder was scattered among such items as agricultural equipment, telecommunications equipment, aircraft, and scientific apparatus.

5. The United States still is OPEC's largest supplier of technology-related products although its share slipped from 27% in 1972 to 25% in 1974. Venezuela, Iran, Saudi Arabia, and Indonesia — in that order — were the leading US customers, taking 70% of our technology-related exports to OPEC countries in 1974.

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\* Technology-related imports include scientific apparatus (SITC 861) and all machinery and equipment in SITC category 7, except major household appliances (SITC 725).

# Developed Countries: Market Share of OPEC Technology-Related Imports



<sup>1</sup>Including Belgium /Luxembourg, Canada, Norway, Sweden, Switzerland, and Austria.

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6. Following the United States were West Germany (20%), Japan (17%), and France (13%). The market share of these three grew from 1972 to 1974 while the UK, Italian, and Canadian shares fell.

7. The United States dominates in the export of machinery for special industries, such as the paper, printing, food processing, construction, and mining industries; in the provision of heating and cooling equipment, pumps, powered tools, and forklift trucks and other mechanical handling equipment; and in the sale of aircraft and railway vehicles (see Appendix A).

8. Motor vehicles account for one-fifth of US technology exports, although both West Germany and Japan top the United States in motor vehicle sales to OPEC. The West Germans also are strong in sales of agricultural machinery -- tractors, dairy equipment, and harvesting and cultivating equipment. Japan shows up especially well in the telecommunications field; its share of these sales jumped from 28% in 1972 to 40% in 1974.

9. Middle East countries have been taking more than two-thirds of OPEC imports of technology-related goods. Iran has been the largest customer. Its imports of \$2.2 billion from the West represented 20% of the OPEC total in 1974 and were nearly double those of either of the next two countries, Saudi Arabia and Venezuela with \$1.3 billion each (see Table 1). Algeria and Indonesia followed, with imports of about \$1.2 billion each, and Libya was next with \$1.1 billion. Nearly all of the increase in the value of OPEC imports since 1972 went to the Middle East; in Venezuela, 1974 imports in real terms were 8% less than in 1972.

Table 1

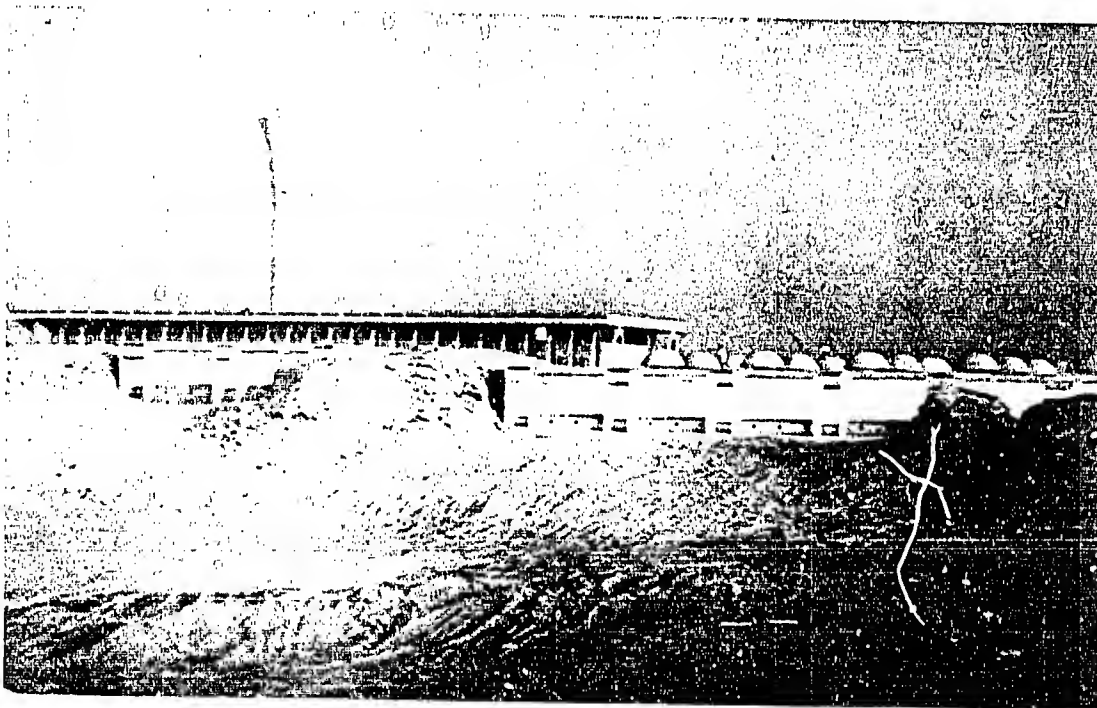
OPEC Countries: Technology-Related Imports  
from 13 Developed Countries

	Billion US \$		
	1972	1973	1974
<b>Total</b>	<b>5.2</b>	<b>6.9</b>	<b>11.3</b>
Iran	1.0	1.4	2.2
Saudi Arabia	0.5	0.7	1.3
Venezuela	1.0	1.1	1.3
Algeria	0.6	0.8	1.2
Indonesia	0.5	0.7	1.2
Libya	0.4	0.6	1.1
Iraq	0.2	0.2	0.8
Nigeria	0.5	0.6	0.8
Kuwait	0.2	0.3	0.5
UAE	0.1	0.2	0.5
Ecuador	0.1	0.2	0.3
Qatar	0.1	0.1	0.1

10. In addition to technology-related products, foreign technical assistance programs have mushroomed in all OPEC countries, particularly in Iran and Saudi Arabia. The largest programs involve the oil industry. Although the properties of Western firms are being nationalized, the companies are being retained to handle everything from marketing to training of managers and engineers.



11. The United States and other Western countries also are moving into other areas. In Iran the United States is helping train 40,000 industrial workers annually, and approximately 14,000 Iranian students are attending American colleges and universities. In Saudi Arabia the US Corps of Engineers is acting as a contracting agent for military base construction. And US and other Western financial institutions are now helping the oil producers decide how to invest their surplus revenues.



US-designed university of petroleum and minerals near Dhahran, Saudi Arabia.

#### New Development Plans

12. In the last two years the OPEC countries have adopted even more grandiose development programs. Multiyear investment plans range from a staggering \$70 billion for Iran and Nigeria, down to about \$9 billion for Libya (see Appendix B). Most of these plans, hastily put together in the rush of new oil earnings, are either unattainable or, as the Saudis indicate privately, are deliberately exaggerated to improve the government's image at home and to stave off a flood of LDC requests for credits. The Saudis also want to point out to other OPEC members that they need the bulk of their oil revenues for domestic development and thus should not have to absorb too disproportionate a share of any cut in oil output needed to maintain prices.

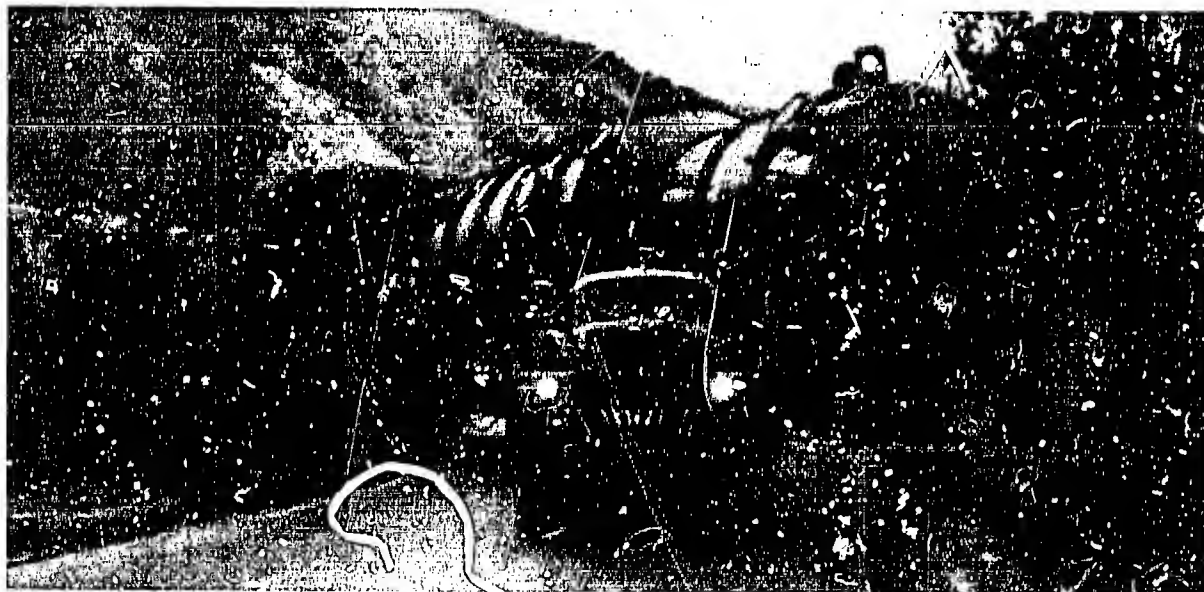
13. In any case the OPEC development programs will be stretched out by serious bottlenecks. Like other less developed countries, OPEC nations suffer from a shortage of skilled manpower, inadequate transportation and communications networks, and a small, technically backward industrial base. They must start nearly from scratch in establishing basic industries such as iron and steel, agricultural machinery, and even petrochemicals for which they are particularly well suited. And they must spend the time and money it takes to provide the necessary infrastructure -- from roads and hospitals to a well-educated population. All OPEC states are following a highly capital intensive development strategy with most Middle East countries placing the greatest emphasis on this approach because severe labor constraints leave them no choice.



Truck route in Iran.

14. For the time being, Iran and Saudi Arabia will be the largest customers for Western technology:

The *Persian Gulf sheikdoms* and *Libya*, with their small populations (see Table 2), will likely become service-oriented rather than industrialized economies, achieving a high standard of living fairly quickly, like Kuwait.



Fractionating tower en route to a Tehran refinery.

Table 2

OPEC Countries: Economic Characteristics<sup>1</sup>

	Population Mid-1975 (Million)	GNP 1975 Esti- mate (Bil- lion US \$)	Per Capita GNP 1975 Esti- mate (US \$)	Crude Oil Produc- tion 1975 Esti- mate (Thou- sand b/d)	Total Imports (F.O.B.) 1975 Esti- mate (Bil- lion US \$)	Current Account Balance 1975 Esti- mate (Bil- lion US \$)	Foreign Official Assets December 1975 Esti- mate (Bil- lion US \$)
Algeria	16.8	13	770	920	6.2	-2.5	1.6
Ecuador	6.7	4	600	165	1.2	-0.6	0.3
Indonesia	131.2	24	180	1,310	4.7	0.0	1.6
Iran	33.2	55	1,660	5,430	13.9	4.2	12.0
Iraq	11.0	13	1,180	2,310	5.2	2.9	5.8
Kuwait	1.0	9	9,000	2,130	2.0	6.3	16.0
Libya	2.4	9	3,750	1,495	4.5	0.5	3.0
Nigeria	63.0	33	520	1,805	5.3	1.4	7.0
Qatar	0.2	1	5,000	405	0.5	1.0	2.8
Saudi Arabia	6.1	30	4,920	7,020	5.6	19.8	38.4
UAE	0.2	6	30,000	1,650	2.4	4.4	11.4
Venezuela	12.0	29	2,420	2,390	5.5	2.5	9.0

<sup>1</sup>1. Excluding Gabon.

*Indonesia, Algeria, and Venezuela*, although having much larger populations, will be held back by the limited size of their oil revenues relative to their development goals.

*Nigeria*, with more than 60 million people and one of the least developed economies in OPEC, will need much more than money to develop rapidly.

*Iraq*, even with its small population, probably can mount a moderate industrialization campaign, especially if it continues to increase its commercial ties with the West and reduces its dependence on the USSR.

*Iran* has the best chance for economic modernization because of its large population and a decade of rapid growth on which to build.

*Saudi Arabia*, although sparsely populated, will spend a good deal of its huge excess revenues on foreign technology. Already, per capita imports of technology are running 17 times the level of heavily populated Nigeria and 23 times that of Indonesia.

#### *Iran*

15. Last year the Shah of Iran predicted that in 10 years his country would be at the same stage of industrial development as France, West Germany, and the United Kingdom are today. Although clearly unrealistic, the Shah does have a large-scale development program under way.

16. Approximately two-thirds of Tehran's investments will support education, housing, transportation, communications, and other basic activities. The remaining third is to be spent on industrial projects based on the country's substantial reserves of coal, copper, iron ore, and of course oil and natural gas.

- At least a dozen petrochemical plants are in various stages of development, mainly to meet domestic demand for fertilizer.
- A complete \$6 billion natural gas complex is scheduled, based on Iran's vast reserves - possibly the world's largest.
- Nuclear powerplants worth \$2 billion are planned.

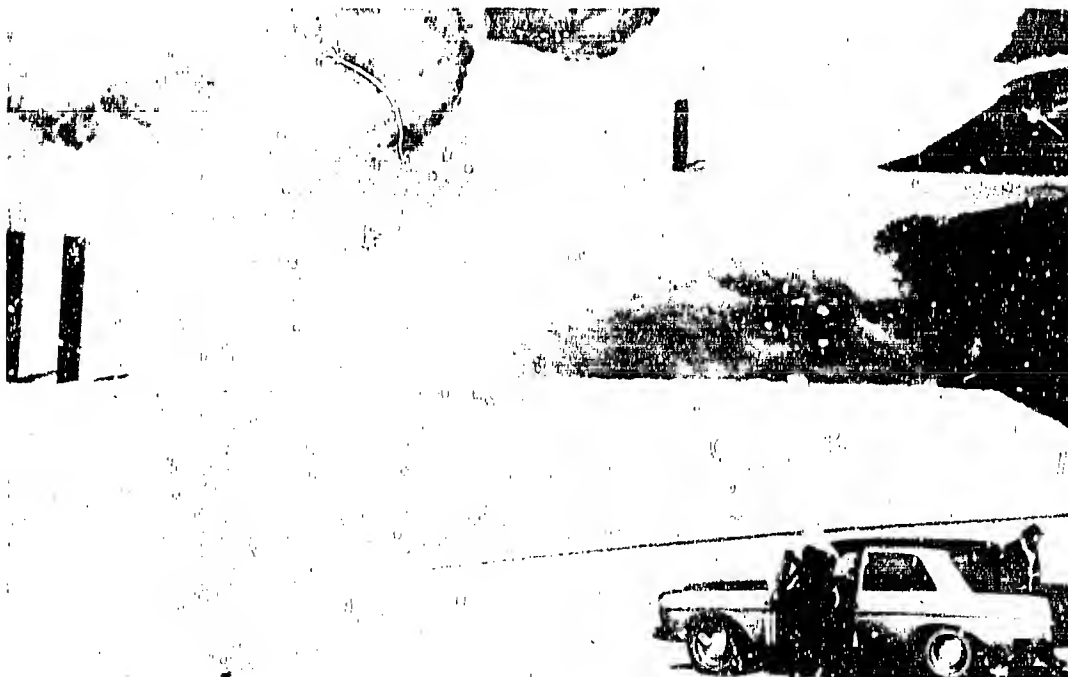
- Five billion dollars in investment is slated to boost steel output from 600,000 tons a year in 1975 to 15 million tons by the early 1980s.
- Major new copper facilities are being constructed under contracts with US firms; output of refined copper is expected to reach 200,000 tons in the early 1980s.

### *Saudi Arabia*

17. Although concerned that rapid modernization will undermine the country's political and social traditions, Saudi Arabia has by far the most ambitious spending plans given the size of its population. Riyadh plans to devote nearly two-thirds of its outlays to modernize its domestic economy and to upgrade personal consumption. Fifteen billion dollars is allocated to education and social services while \$29 billion is tabbed for transport, communications, housing, and other basic facilities. Twenty-five billion dollars is earmarked for industrialization, based mainly on oil and natural gas resources.

- A massive \$5 billion gas gathering and treatment system will be built to use the 3.5 billion cubic feet per day of natural gas currently being flared and thus wasted – an amount equal to 25% of total Canadian gas production.
- Five petrochemical plants worth \$3 billion and three oil refineries worth \$2 billion are scheduled.
- A gas-fired \$2 billion steel complex is to supply some 3.5 million tons per year in the 1980s.
- Several large-scale desalinization plants valued at more than \$7 billion are planned to provide water for industrial, agricultural, and urban use.

18. The industrial plans of other OPEC countries follow the same pattern as Iran and Saudi Arabia – on a smaller scale. Major products will include petrochemicals such as fertilizers and plastics and, especially in Algeria, liquefied natural gas. Most countries plan to build steel and alumina plants, and a few are planning to construct automobile assembly plants on the basis of imported component parts.



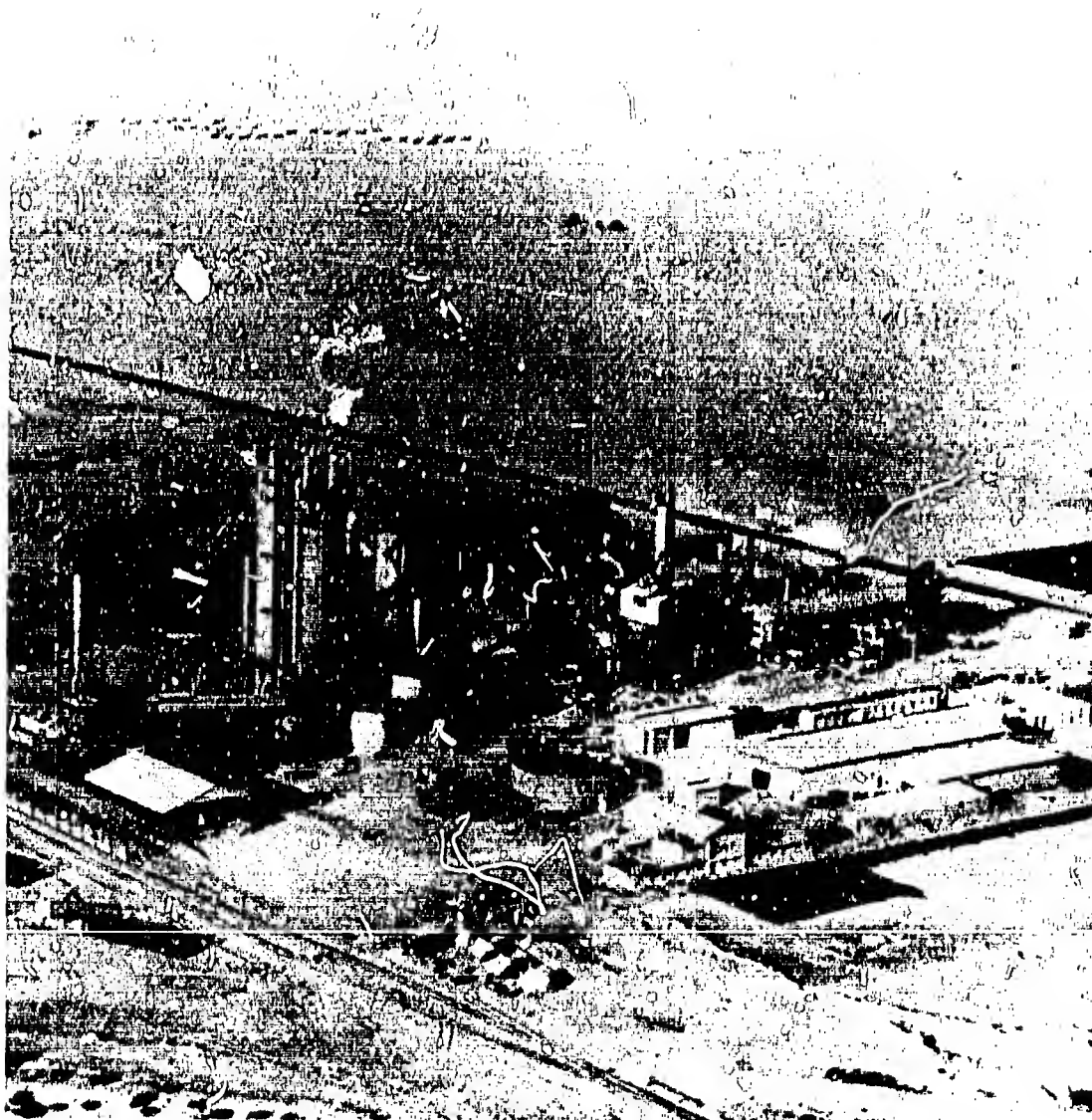
Saudi gas being flared.

#### OPEC Technology-Related Imports Through 1980

19. A number of projects involving large inputs of foreign technology have already been started or are firmly on the books and should be on stream in the 1980s.

- Most are energy related, including five petrochemical complexes in Saudi Arabia; a complete natural gas complex in Iran; liquefied natural gas plants in Iraq, Algeria, and Nigeria; new or expanded refineries in nearly every major OPEC country; and nuclear powerplants in Iran.
- Other industrial projects include a complete port complex in Iran, expansion of steel mill capacity in Iran and Venezuela, and telecommunications facilities in Nigeria, Saudi Arabia, Algeria, and Iran. Algeria has purchased an electronics plant to produce radios, TV sets, and other consumer items.

20. By 1980 the OPEC market for technology-related goods will likely exceed \$50 billion and the United States should continue to receive a large share of the business. The United States leads in the value of contracts signed with OPEC countries and also is benefiting from secondary purchases by primary contractors.



Further more fertilizer complexes will join this US-built plant in Eastern Saudi Arabia.

Most recently, a US firm was given the services contract for Saudi Arabia's \$4.6 billion gas gathering system. Other countries are pressing hard; contracts concluded this year were highlighted by Tehran's \$2 billion purchase of nuclear powerplants from West Germany and France and its \$1 billion port and steel development contracts awarded to the Italians. The Japanese have been winning smaller contracts throughout the area, especially for petrochemical facilities.

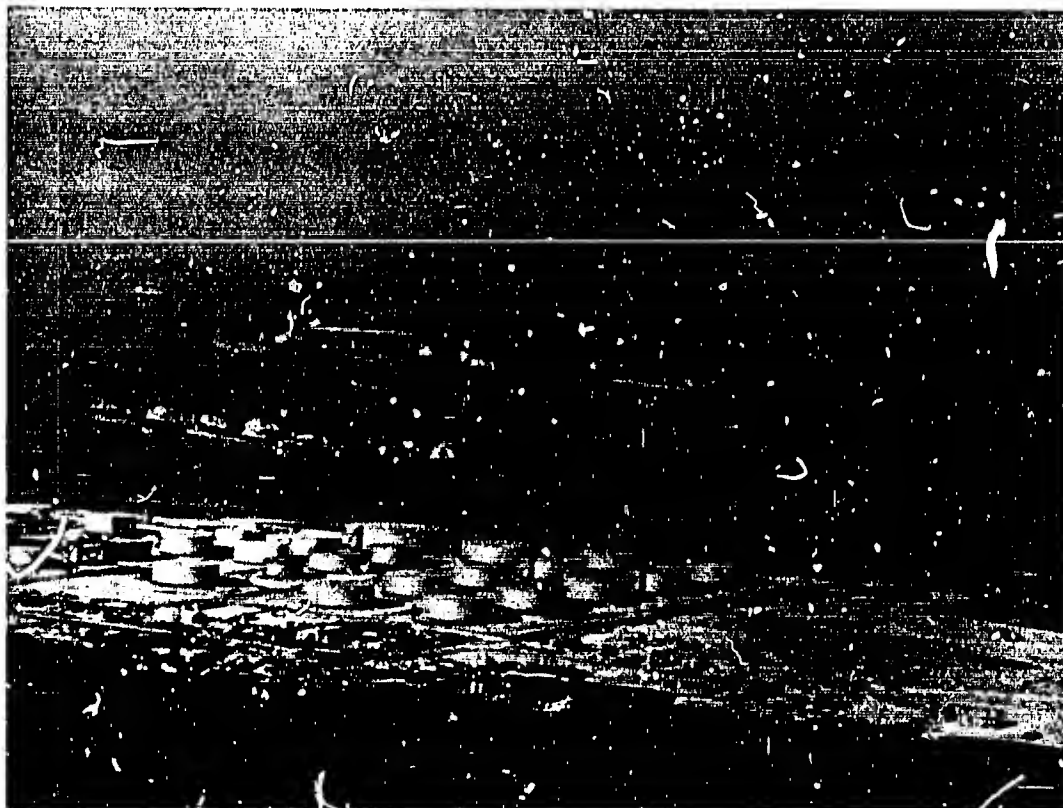


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### Impact on OPEC

21. Much of the transfer of technology-related goods to OPEC will go to building up and modernizing the domestic economy rather than developing export-oriented industries. Technology imports will result in better transport facilities, schools, hospitals, and technical institutes and a marked increase in supplies of food, better clothing and housing, and consumer durables.

22. Some OPEC countries, nonetheless, will be able to export products turned out by the newly acquired technology. The availability in OPEC, especially in the Middle East, of cheap energy for metallurgical processes and almost unlimited raw materials for petrochemical production provide ideal conditions for establishing plants for aluminum, ammonia, urea, ethylene, plastics, fertilizer, and some specialized steel products. Domestic needs will absorb only a part of the output of chemical and metals; substantial amounts will be available for export. And because the technology will start off at the highest world level and because production often will be supervised by Western engineers, these products should be competitive in the West.



Oil will remain the backbone of OPEC industrialization.

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23. In a number of instances, Western firms will share ownership of the facilities with OPEC and/or market the output of the new plants in the West. The Saudis in fact are insisting on active Western participation in new industrial deals to avoid being stuck with large plants whose output cannot be marketed.

24. One danger in simultaneous development by several OPEC countries in industries such as petrochemicals is that production could easily exceed world market demand. For the next five years at least the buildup of petrochemical capacity will not have an appreciable impact on world markets. Beyond 1980, however, Persian Gulf producers probably will have a large export capability for such products as ammonia, nitrogen fertilizer, ethylene, and ethylene products. None of the OPEC countries will emerge as major steel exporters, except perhaps in some specialized product areas such as the growing market for metallized pellets derived from plants that use direct-gas reduction technology imported from the West.

25. Even though OPEC plants will incorporate advanced Western technology, the OPEC countries will not be able to produce and export any high-technology items. The receipt of technology does not confer a capability to reproduce that equipment, let alone export it.

26. Iran, in a better position to assimilate technology than any of the other Middle East OPEC countries, will have to master the production of petrochemicals before it can even consider designing and producing advanced petrochemical equipment. The Iranian assortment of such products as steel, machine tools, and electrical equipment will long remain inadequate for local needs. Moreover, many technicians and middle managers are likely to be absorbed into the burgeoning government bureaucracy or into the defense sector.

27. Iran ultimately may be able to export technical services for the exploration and development of oil fields and to provide some less advanced oil field equipment. Even now, all-Iranian companies are servicing certain oil fields in Iran.

28. Saudi Arabia's prospects for selling technology-related goods or services are much less than Iran's. Largely because of manpower constraints, they intend to leave technical and management operations to foreigners.

29. Growing imports of technology will make OPEC countries more dependent on foreign technology rather than less. As industrialization of the OPEC

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countries matures, they will need a continuing inflow of machinery and technical assistance to ensure that their plants operate with the latest available technology. They also will want to import goods and technology to build supporting industries, in effect generating a second wave of industrial development. For the manufacture of many complex products, OPEC countries will still have to buy components for many years. Finally, as the OPEC countries take on each new layer of technology, their Western suppliers will have moved ahead to new technologies -- and to new exports for the OPEC countries to absorb.

## APPENDIX A

Footnote at end of table.

OPEC COUNTRIES  
TECHNOLOGY-RELATED IMPORTS (Continued)

Commodities	Group of Thirteen	United States	Canada	Japan	United Kingdom	Germany	France	Italy	Belgium- Luxem- bourg	Other Europe:
		Thousand US \$								
Machines for special indus- tries	1972 1973 1974	138,605 597,167 1,078,635	175,135 247,629 383,099	3,642 6,136 12,909	26,567 36,573 93,012	68,710 89,560 193,713	32,500 63,163 117,864	27,194 33,210 67,593	16,806 23,385 25,702	14,334 18,632 35,077
Machines, nonelectrical, not elsewhere specified (NES)	1972 1973 1974	1,079,099 1,335,706 2,094,770	340,755 394,212 661,530	2,967 4,567 10,866	52,566 134,858 217,138	193,320 255,932 394,677	122,137 156,360 251,570	134,456 145,420 234,809	20,532 23,160 25,729	35,434 54,197 56,309
Electric power machinery and switchgears	1972 1973 1974	313,598 436,139 688,722	70,403 92,075 184,799	2,405 2,217 7,047	42,456 65,838 83,689	54,215 75,507 134,979	46,353 59,545 100,895	25,610 30,837 44,790	12,345 15,153 15,924	15,571 26,522 32,729
Electrical distributing equip- ment	1972 1973 1974	96,763 116,977 262,629	5,142 10,034 29,533	1,933 256 551	23,431 21,577 45,332	19,421 26,635 55,517	13,239 11,757 22,341	6,695 11,470 23,397	6,995 1,879 5,074	6,905 7,174 25,667
Telecommunications equip- ment	1972 1973 1974	330,621 459,119 702,035	44,176 49,613 72,192	17,073 24,077 8,918	91,195 146,160 250,621	43,212 40,763 65,910	29,627 40,624 76,285	24,505 22,301 25,552	10,186 15,493 15,325	35,165 35,777 57,422
		Percent								
Machinery for special indus- tries	1972 1973 1974	100.0 100.0 100.0	40.6 41.5 35.5	0.8 1.0 1.2	6.1 6.2 8.6	16.1 13.2 13.4	15.7 15.0 15.4	7.4 10.6 10.9	3.8 3.9 2.4	3.3 3.1 3.3
Machines, nonelectrical, NES	1972 1973 1974	100.0 100.0 100.0	31.6 29.5 31.6	0.3 0.3 0.5	7.7 10.1 10.4	13.3 12.3 10.0	17.9 19.4 15.8	12.5 10.9 11.2	1.9 1.7 1.4	3.6 4.1 4.1
Electric power machinery and switchgears	1972 1973 1974	100.0 100.0 100.0	22.4 21.1 25.8	0.5 0.5 1.0	13.5 15.1 12.2	14.2 14.4 12.2	14.5 13.7 14.6	5.2 7.0 6.5	3.9 4.2 2.3	5.0 6.1 4.5
Electrical distributing equip- ment	1972 1973 1974	100.0 100.0 100.0	5.4 8.6 11.2	2.0 0.2 0.3	24.2 18.4 17.3	20.1 22.8 21.3	13.7 10.1 8.5	6.9 9.8 5.9	0.7 1.4 1.9	7.1 6.1 9.5
Telecommunications equip- ment	1972 1973 1974	100.0 100.0 100.0	13.4 10.8 10.3	5.2 5.2 1.3	27.6 31.8 40.0	9.8 8.9 9.4	9.0 8.8 10.9	7.4 4.9 4.1	3.1 1.0 2.2	11.5 8.4 8.2

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OPEC COUNTRIES  
TECHNOLOGY-RELATED IMPORTS (Continued)

Commodities	Group of Thirteen	United States	Canada	Japan	United Kingdom	Germany	France	Italy	Belgium Luxem- bourg	Other Europe:
						Thousand US \$				
Electromedical X-ray equip- ment	14,844	4,306	172	526	1,082	5,563	1,863	545	96	691
	18,180	4,798	191	810	1,656	6,806	2,985	632	76	226
	24,728	7,344	103	1,407	2,564	8,331	3,409	801	384	385
Electrical machinery, NES	208,728	46,338	2,351	30,213	33,241	45,655	32,436	10,293	1,448	7,553
	204,481	62,625	8,448	39,308	37,159	75,286	46,136	12,084	2,295	11,110
	405,675	90,079	4,902	67,348	53,780	84,692	62,863	17,130	4,351	20,620
Railway vehicles	26,451	3,305	9,477	2,452	2,011	4,126	3,527	292	233	1,028
	45,253	18,589	7,241	2,262	3,223	6,707	3,349	3,152	316	414
	77,051	30,176	430	3,284	2,290	4,150	25,899	8,557	1,907	349
Road motor vehicles	1,225,793	257,493	83,127	209,002	171,834	247,117	137,629	80,294	7,936	31,341
	1,675,631	331,360	48,439	343,462	216,344	380,465	198,952	107,822	8,094	40,690
	3,128,903	539,353	113,115	678,590	260,454	798,039	450,707	184,305	16,223	53,117
Road vehicles, nonmotor	53,918	6,515	---	7,003	17,727	6,511	4,385	9,266	691	1,820
	67,382	5,728	887	8,155	18,024	11,730	6,078	11,358	4,487	935
	146,744	29,166	1,114	12,116	17,678	39,249	14,234	25,492	3,667	4,028
						Percent				
Electromedical X-ray equip- ment	100.0	29.0	1.2	3.5	7.3	37.5	12.6	3.7	0.6	4.7
	100.0	26.4	1.1	4.5	9.1	37.4	16.4	3.5	0.4	1.2
	100.0	29.7	0.4	5.7	10.4	33.7	13.8	3.2	1.6	1.6
Electrical machinery, NES	100.0	21.8	1.1	14.5	15.9	21.9	15.5	4.9	0.7	3.6
	100.0	21.3	2.9	13.3	12.6	25.6	15.7	4.1	0.5	3.8
	100.0	22.2	1.2	15.6	13.3	20.9	15.5	4.2	1.1	5.1
Railway vehicles	100.0	12.5	35.8	9.3	7.6	15.6	13.3	1.1	0.9	3.9
	100.0	41.1	16.0	5.0	7.1	14.8	7.4	7.0	6.7	0.9
	100.0	39.2	0.6	4.3	3.0	5.4	33.6	11.1	2.5	0.5
Road motor vehicles	100.0	21.0	6.8	17.1	14.0	20.2	11.2	6.6	0.6	2.6
	100.0	19.8	2.9	20.5	12.9	22.7	11.9	6.4	0.1	2.4
	100.0	17.2	3.8	21.7	8.3	25.5	14.4	5.9	0.5	2.7
Road vehicles, nonmotor	100.0	12.1	---	13.0	32.9	12.1	8.1	17.2	1.3	3.4
	100.0	8.5	1.3	12.1	26.7	17.4	9.0	16.9	6.7	1.4
	100.0	19.9	0.8	8.3	12.0	26.7	9.7	17.4	2.5	2.7

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OPEC COUNTRIES  
TECHNOLOGY-RELATED IMPORTS (Continued)

Commodities	Group of Thirteen	United States	Canada	Japan	United Kingdom	Germany	France	Italy	Belgium- Luxem- bourg	Other Europe <sup>1</sup>
						Thousand US \$				
Aircraft	1972	294,353	167,731	21,952	5,765	2,505	555	41,764	23,656	4,361
	1973	296,196	160,931	2,302	124	41,081	569	19,210	36,493	2,377
	1974	549,416	330,779	9,205	199	55,883	7,624	73,442	69,664	2,200
Ships and boats	1972	109,482	14,533	149	61,196	1,384	13,879	3,574	4,924	6,251
	1973	141,602	10,032	17	31,616	4,123	41,355	25,869	17,898	8
	1974	215,308	24,051	67	98,681	24,584	40,206	10,632	10,784	14
Scientific instruments and apparatus	1972	144,817	42,600	649	14,341	27,791	26,672	16,347	7,009	2,476
	1973	191,531	49,564	2,473	19,606	28,540	43,075	24,386	9,718	2,401
	1974	285,601	65,072	935	38,777	36,387	65,455	44,887	14,226	2,825
Column sums	1972	5,211,130	1,406,119	151,887	720,423	748,139	902,541	555,760	415,362	94,017
	1973	6,901,773	1,715,919	119,984	1,044,589	895,182	1,383,238	799,249	524,247	125,333
	1974	11,330,536	2,802,619	191,085	1,894,182	1,234,448	2,320,188	1,419,513	839,200	142,794
										456,507
							Percent			
Aircraft	1972	100.0	57.0	7.5	2.0	9.7	0.2	14.2	8.0	1.5
	1973	100.0	54.3	0.8	Negl.	14.9	0.2	16.6	12.3	0.8
	1974	100.0	60.2	1.7	Negl.	10.2	1.4	13.4	12.7	0.4
Ships and boats	1972	100.0	13.3	0.1	55.9	1.3	12.7	3.3	4.5	5.7
	1973	100.0	7.1	Negl.	22.3	2.9	29.2	18.3	12.6	Negl.
	1974	100.0	11.2	Negl.	45.8	11.4	18.7	4.9	5.0	Negl.
Scientific instruments and apparatus	1972	100.0	29.4	0.4	9.9	19.2	18.4	11.3	4.8	1.7
	1973	100.0	25.9	1.3	10.2	14.9	22.9	12.7	5.1	1.3
	1974	100.0	22.8	0.3	13.6	12.7	22.9	15.7	5.0	1.0
Column sums	1972	100.0	27.0	2.9	13.8	14.4	17.3	10.7	8.0	1.5
	1973	100.0	24.9	1.7	15.1	13.0	20.0	11.6	7.6	1.8
	1974	100.0	24.7	1.7	16.7	10.9	20.5	12.5	7.4	1.3

<sup>1</sup> Including Austria, Norway, Sweden, and Switzerland.

APPENDIX B

OPEC COUNTRIES: SPENDING PLANS AND DEMAND FOR FOREIGN TECHNOLOGY

	Billion US \$	Percent		
<b>Algeria</b>				
Investment planned for 1974-77:				
Total	27.7	100.0		
Industry	12.1	43.7		
Agriculture	3.0	10.8		
Infrastructure and power	5.0	18.0		
Social services	6.2	22.4		
Other	1.4	5.1		
			Probable Contractors	Major Purpose
				Amount (Million US \$)
Major projects involving foreign technology:				
Three liquefied natural gas (LNG) plants (515.6 billion cubic feet by 1980)	United States, United Kingdom	Export	500	
Several gas pipelines	Italy	Export	....	
Expansion of refinery capacity (550,000 b/d by 1979)	Japan, Italy, United Kingdom	Export	550	
Petrochemical plants (fertilizer and plastics)	....	Domestic	....	
Expansion of steel production	Japan, Sweden, USSR	Domestic	....	
Electronics complex (motors, home enter- tainment units)	United States	Domestic	250	
Expansion of automotive production (motors and chassis for trucks, buses, and autos)	West Germany, France	Domestic	200	
Telecommunications				
Microwave system under construction	Japan, France	Domestic	....	
Telephone and circuit manufacture (140,000 telephones, 100,000 circuits)	Spain	Domestic	....	
	Million US \$	Percent		
<b>Ecuador</b>				
Investment planned for 1975:				
Total	165.0	100.0		
Public works	77.4	46.9		
Natural resources	8.0	4.8		
Agriculture	74.8	45.3		
Industry and commerce	4.8	2.9		
			Probable Contractors	Major Purpose
				Amount (Million US \$)
Major projects involving foreign technology:				
FT4C gas turbine plant	United States	Domestic	....	
Thermal powerplant	Japan	Domestic	9.4	

APPENDIX B

OPEC COUNTRIES: SPENDING PLANS AND DEMAND FOR FOREIGN TECHNOLOGY  
(Continued)

	Billion US \$	Percent
<b>Iran</b>		
Investment planned for 1973-77:		
<b>Total</b>	<b>69.6</b>	<b>100.0</b>
Economic affairs	44.9	64.5
Industry	11.5	16.5
Oil and gas	11.6	16.7
Transportation and communications	7.3	10.5
Agriculture	4.6	6.6
Electricity	4.6	6.6
Water	2.5	3.6
Telecommunications	1.4	2.0
Mines	1.0	1.4
Tourism	0.4	0.6
Public affairs	5.6	8.0
Social affairs	19.1	27.4

	Probable Contractors	Major Purpose	Amount (Billion US \$)
<b>Major projects involving foreign technology:</b>			
Petrochemical plants	United States	Domestic	2.0
Petrochemical plant	Japan	Export	1.9
Methanol plant	United States	Domestic	0.2
Special steels plant	France	Domestic	0.2
Integrated steel plant	United Kingdom	Domestic	1.7
Steelmaking complex	Italy	Domestic	3.0
Port construction, Bandar Abbas	Italy	Domestic	1.0
Nuclear powerplants	West Germany, France	Domestic	2.0
Copper mining	United States	Domestic	1.0
Natural gas complex	United States, Japan	Export	5.9
Refinery (200,000 b/d)	United States, West Germany	Domestic	....
Oil and gas pipelines	France	Domestic	0.1
Crude oil pipelines	Italy	Domestic	0.2
Crude oil pipeline	United States	Domestic	0.1
Telecommunications (telephones)	United States	Domestic	0.6

	Billion US \$	Percent
<b>Iraq</b>		
Investment planned for 1976-80		
<b>Total</b>	<b>34.0</b>	<b>100.0</b>
Oil, gas, and other industry	8.0	23.5
Agriculture, including reclamation and rural roads	16.0	47.1
Transportation and communications	5.0	14.7
Building and services	5.0	14.7



APPENDIX B

OPEC COUNTRIES: SPENDING PLANS AND DEMAND FOR FOREIGN TECHNOLOGY  
(Continued)

	Probable Contractors	Major Purpose	Amount (Billion US \$)
Iraq (continued)			
Major projects involving foreign technology:			
Petrochemical:			
Complex including fertilizer, \$570 million	Japan	Domestic/export	....
Urea, 3,200 tons daily	Japan, Italy	Domestic/export	....
Ammonia plant, 2,000 tons daily	Denmark	Domestic/export	....
Oil refinery and gas liquefaction plants (including 3.3 million metric tons of liquefied petroleum gas)	Japan	Export	....
Communications			
Satellite ground stations	France	Domestic	....
Microwave projects	France, Japan	Domestic	....
Industry			
Steel plant, 400,000 tons	France	Domestic	....
Power station, 800-megawatt (MW) thermal power	Italy	Domestic	....
Auto assembly	France, Sweden	Domestic	....

Billion US \$      Percent

Libya

Investment planned for 1973-75:

<b>Total</b>	<b>8.7</b>	<b>100.0</b>
Agriculture	1.9	21.8
Industry	1.8	20.7
Electricity, transportation, commerce	1.7	19.5
Social services	2.3	26.4
Other	1.0	11.5

	Probable Contractor:	Major Purpose	Amount (Million US \$)
Major projects involving foreign technology:			
Ethylene plant (300,000 tons per year by 1978)	United Kingdom	Domestic	200
Urea plant (2,700 tons per day)	....	Domestic	....
Methanol plant	West Germany	Domestic/export	90
Ammonia plant (2,000 tons per day by 1978)	....	Domestic	142
Synthetic fibers (300 tons per day of nylon and 300 tons per day of polyester by 1978)	....	Domestic	500
Expansion of refining capacity (287,000 b/d by 1978)	Italy	Export	450

Billion US \$      Percent

Nigeria

Investment planned for 1975-80:

<b>Total</b>	<b>69.6<sup>1</sup></b>	<b>100.0</b>
Agriculture, forestry, and fishery	5.5	7.9
Mining and quarrying	6.1	8.8
Manufacturing	11.8	17.0

APPENDIX B

OPEC COUNTRIES: SPENDING PLANS AND DEMAND FOR FOREIGN TECHNOLOGY  
(Continued)

	Billion US \$	Percent
Nigeria (continued)		
Power	1.7	2.4
Commerce and finance	1.0	1.4
Transportation and communications	21.7	31.2
Social infrastructure	7.9	11.4
Regional development	6.7	9.6
Administration and other	7.2	10.3

1. The Nigerian government has announced a \$2.1 billion cutback in this program. The government now wants to spend \$32 billion and have the private sector contribute \$16 billion.

	Probable Contractors	Major Purpose	Amount (Billion US \$)
Major projects involving foreign technology:			
Two LNG plants, each 600 million cubic feet per day	United States, Italy, Netherlands, United Kingdom	Export	1.2
Three refineries, total planned output 185,000 b/d	....	Domestic	0.6
Iron and steel 1.5 million tons per year	USSR	Domestic	1.3
Electric power, thermal and hydroelectric	....	Domestic	1.7
Communications, expansion of automatic exchange facilities	United States	Domestic	1.3

	Billion US \$	Percent
Saudi Arabia		
Investment planned for 1975-80:		
Total	68.5 <sup>1</sup>	100.0
Economic resource development	24.9	36.4
Water and related electric power	9.6	14.0
Agriculture	0.6	0.9
Petroleum and minerals	0.4	0.6
Other electric power	0.5	0.7
Manufacturing	13.6	19.9
Other public works	0.2	0.3
Education	10.3	15.0
Social services	4.3	6.3
Physical infrastructure	29.0	42.3
Roads	3.1	4.5
Ports	2.0	2.9
Airports	3.6	5.3
Municipal government projects	13.2	19.3
Housing	4.1	6.0
Holy City and Hadj	1.4	2.0
Other	1.6	2.3

1. For capital projects within planned governmental expenditures of \$142 billion.

APPENDIX B

OPEC COUNTRIES: SPENDING PLANS AND DEMAND FOR FOREIGN TECHNOLOGY  
(Continued)

	Probable Contractors	Major Purpose	Amount (Billion US \$)
Major projects involving foreign technology:			
Water desalinization and power	Japan, West Germany, France, United States	Domestic	7.2
Gas-gathering and treatment	United States	Domestic/export	4.6
Five petrochemical complexes	United States, Japan	Export	3.2
Three export refineries	United States, Japan	Export	1.9
Refinery expansion	United States	Export	0.8
Lube oil refinery	United States	Domestic	0.6
Four fertilizer plants	United Kingdom, Tai- wan, United States	Domestic	0.4
Aluminum plants	....	Domestic	0.4
Steel plant (3.5 million tons per year)	United States, Netherlands, West Germany, Japan	Domestic	1.6
Crude oil pipeline	United States	Domestic/export	1.5
LNG pipeline	United States	Domestic/export	0.3
Health (hospitals and equipment)	United States	Domestic	3.5
Communications	France, United States	Domestic	0.9

Billion US \$      Percent

Venezuela

Investment planned for 1975-79:

Total	36.6	100.0
Social services and finance	13.3	36.3
Manufacturing	9.3	25.4
Agriculture	5.1	13.9
Petroleum and mining	1.6	4.4
Miscellaneous	7.3	19.9

	Probable Contractors	Major Purpose	Amount
Major projects involving foreign technology:			
Petrochemical plants (fertilizer)	United States	Export	....
Expansion of steel production (10 million tons by 1980)	United States	Export	....
Expansion of aluminum production (900,000 tons by 1980)	United States, Japan	Export	....
Agricultural machinery (6,000 tractors and 10,000 diesel engines annually)	....	Domestic	...